# Improvements in Data Communication in Switzerland

Amélioration dans l'échange des données en Suisse

Verbesserungen des Datenverbunds in der Schweiz

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**SUMMARY**
With the increasing use of computers, data communication is needed in practically all phases of the design and construction process. Incompatibilities in hardware and software, however, often make the exchange of data difficult or even impossible. In Switzerland efforts were made by the Swiss Society of Engineers and Architects during the past two years to improve this situation. These efforts and the resulting Recommendation are discussed in the paper. The impact of this Recommendation on the Engineering community is discussed.

**RÉSUMÉ**
Avec l'utilisation toujours plus grande d'ordinateurs apparait la nécessité d'échanger des données à chaque stade de la conception et de la construction d'un ouvrage. Cependant, les incompatibilités des matériels et des logiciels rendent cette communication souvent difficile sinon impossible. Au cours des deux années écoulées, la Société Suisse des Ingénieurs et Architectes a travaillé pour remédier à cette situation. Cet exposé décrit ces efforts ainsi que la recommandation qui en résulte. Il montre l'impact de cette recommandation sur le secteur du génie civil.

**ZUSAMMENFASSUNG**
Mit dem zunehmenden Einsatz von Computern wird der Datenaustausch in praktisch allen Phasen der Planung und der Ausführung benötigt. Inkompatibilitäten der Hardware und Software machen aber den Datenaustausch oft sehr schwierig oder verhindern ihn gänzlich. In der Schweiz wurden während der letzten zwei Jahre vom Schweizerischen Ingenieur- und Architektenverein Anstrengungen unternommen, um diese Situation zu verbessern. Diese Arbeit sowie die daraus resultierende Empfehlung werden in der vorliegenden Veröffentlichung diskutiert. Die Auswirkungen dieser Empfehlung auf die Bauindustrie werden besprochen.

## 1. INTRODUCTION

When the first electronic computers became available on the market about 40 years ago, the Civil and Structural Engineers were among the first to use these new facilities. It was realized, that by the use of computers problems which could not be solved till now suddenly could be attacked with new numerical procedures. Among these problems were numerous tasks of structural analysis such as the analysis of plates and shells, nonlinear problems and dynamic problems. In addition to these technical problems many administrative tasks could be handled more effectively by means of computers.

With the rapid increase of the power and the availability of computers and software a new industrial revolution has started. Today we are in the middle of a complete reshaping of our working and social environment. It was soon realized, that inspite of sophisticated software in many cases the exchange of data between different programs was necessary or desirable. The incompatibilities of the software- or hardware-interfaces, however, prevented data communication in many instances. These difficulties in data communication still prevail. This situation was recognized by the Swiss Society of Engineers and Architects (SIA) and efforts were made to improve the data communication situation for the construction industry. A Committee headed by the author was formed to define the rules for the exchange of data.

## 2. DEFINITION OF TASKS

A first study of the situation of Data Communication in the construction industry showed, that the problem was very complex indeed. Practically all parties in a construction project such as the contractor, the architect, the engineer, the owner, the banks etc. have needs for data exchange. The data comprise the whole range from accounting data to structural analysis data and CAD. The hardware and software used by the different parties is usually not compatible. A comprehensive definition of interface formats for all the different tasks seemed to be above the means of the Committee. A study of existing exchange formats such as used in the systems SWIFT or TELETEX indicated, that these formats were only partially suited for the needs of the construction industry. It was also realized that the upcoming new data communication facilities by the PTTs on the basis of fibreglass optics (ISDN etc.) will open up new ways for the exchange of data.

It was soon clear, that an improvement of the data communication situation could be done only in a coordinated step by step approach. Therefore the tasks were defined and restricted as follows:

a) As a first step the exchange of data should be done by means of traditional data carriers such as magnetic tapes, diskettes a.s.o. The use of telephone networks for data exchange was considered to be a second step.

b) The area of application was limited to the exchange of tenders. As a basis for the exchange, the use of Catalogues of Standard

Building Descriptions was considered to be mandatory.

c) The resulting Recommendation on exchange formats should define easy to implement formats for the software developers.

## 3. PILOT PROJECTS

In order to check the feasibility of this approach, two pilot projects were run. The first project used a tender generated by the engineer on an 8"- Diskette on IBM format 1D, 128 bytes/sector. This diskette was sent to a contractor who could read it and filled in the corresponding prices. The tender then was sent back to the engineer for evaluation and comparisons.

A second pilot project was set up to exchange a tender by means of a Diskette from an Olivetti- PC to an IBM- PC. The exchange of data was difficult because the format on the Diskette on Olivetti was different from the format on IBM. Furthermore, it turned out that the data had been encyphered by the software developer. Both difficulties are typical for the present situation in data communication. They could be overcome with some additional efforts.

The two pilot projects showed, that the exchange of data between architect, engineer and contractor is technically quite possible. They also confirmed that substantial savings of time and effort were possible by exchanging data rather than retyping the information. Furthermore, typing errors etc. are eliminated completely by this approach. It is necessary, however, to define the exchange formats hardwarewise and softwarewise. In addition procedures have to be defined to make tenders on data carriers legally binding and to ensure data security.

## 4. SIA RECOMMENDATION V451

The Recommendation V451 contains the rules for Data Communication and defines the exchange formats for tenders. The Recommendation is based on formats for Catalogues of Standard Building Descriptions and references these standard descriptions by codes. The exchange formats were open to discussion until the end of the year 1987. A fixed format was chosen on purpose in order to keep high transparency. It was proposed, that menue- driven interactive programs form the user interface. The fixed format data can later be run through a compacting/ decompacting program to remove unnecessary blanks. Presently pilot interface programs are developed based on that Recommendation which will be available to the engineering community in early 1988. The V451 is planned to be given the character of a code in 1988.

A number of recommendations for improvements were made during the discussion period. They essentially concerned the availability of a free format representation of the data in addition to the fixed format, the representation of Codes (ASCII,EBCDIC), the proposed standard data carriers and the arrangement of some data fields. All these recommendations are presently evaluated and will reflect

in the final version of V451.

Several meetings were held with the city and the canton of Zurich as well as with other owners in the public domain in order to get the cooperation of the owners for the new data exchange facilities. In addition a meeting was held with software developing companies to encourage them to implement the recommended formats into their codes. From their response it can be expected, that a number of engineers, architects and contractors will start exchanging tenders by data carriers rather than by paper in 1988.

## 5. CONCLUSIONS AND RECOMMENDATIONS

The improvement of Data Communication in the area of exchange of tenders will undoubtedly increase the efficiency of the construction industry. The quality of tenders will probably increase and the rate of errors will decrease. The task of comparing different tenders will be greatly simplified by the exchange of data carriers.

There are several steps to follow up. One is to use public or private networks for Data Communication in the near future. For this the use of compacted data formats for the data exchange would be mandatory. Other areas such CAD, structural analysis etc. should be looked at to define standard exchange formats and such to improve further the facilities for data exchange in the construction industry.

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